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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,669	01/24/2006	Tomoharu Kiyuna	Q92767	2893

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EXAMINER	
CLOW, LORI A	

ART UNIT	PAPER NUMBER
1631	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,669	KIYUNA ET AL.	
	Examiner	Art Unit	
	LORI A. CLOW	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/24/2006; 3/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Status

Claims 1-15 and 17 are currently pending and under exam herein. Claims 16 and 18-22 have been cancelled by Preliminary amendment.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. Priority to Japanese Application 2003/282122, filed 29 July 2003 is acknowledged. PCT Application 2004/010852 was filed 29 July 2004.

Information Disclosure Statement

The Information Disclosure Statements filed 24 January 2006 and 14 March 2006 have been considered. Signed copies of PTO forms 1449 are included with the Office Action.

Drawings

The Drawings submitted 24 January 2006 are accepted.

Claim Objections

Claims 13 and 15 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiply dependent claim. See MPEP § 608.01(n). Accordingly, the claim has not been further treated on the merits. Claim 13 recites the measurement method as set forth in any one for claims 5, 6, 8, 10, 11, or 12.

However, claim 10 depends from claim 9, which is a multiply dependent claim. As such, claim 13 and claim 14 will not be treated on the merits, as 14 depends from 13. Claim 15 also recites the measurement method as set forth in any one of claims 1, 2, 4, 5, 6, 10, 11, 12, or 14 and is also improper for the reasons set forth above. Claim 15 will not be further treated on the merits.

Claim Rejections - 35 USC § 101-Non-statutory Subject Matter

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-15 and 17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-15 and 17 are drawn to a method of measuring a chromosome territory, the method detecting a difference in state between a plurality of cells containing a chromosome territory by measuring a desired area of said cells in information of a plurality of images comprising extracting data from images and classifying images into classes.

In accord with the decision in *In re Bilski*, a claim to a process or method must meet the machine-or-transformation test in order to be eligible under 35 USC 101 as statutory subject matter (*In re Bilski*, 545 F.3d 943, 88 USPQ2d 1385 (Federal Circuit, 2008). In other words, the prohibition on patenting abstract ideas has two distinct aspects: (1) when an abstract concept has no claimed practical application, it is not patentable; (2) while an abstract concept may have a practical application, a claim reciting an algorithm or abstract idea can state statutory subject matter only if it is embodied in, operates on, transforms, or otherwise is tied to another class of

statutory subject matter under 35 U.S.C. §101 (i.e. a machine, manufacture, or composition of matter). (*Gottschalk v. Benson*, 409 U.S. 63, 175 USPQ 673, 1972), as clarified in *In re Bilski*, 545 F.3d 943, 88 USPQ2d 1385 (Federal Circuit, 2008) the test for a method claim is whether the claimed method is (1) tied to a particular machine or apparatus or (2) transforms a particular article to a different state or thing.

In the instant case, the method claims are not so tied to another statutory class of invention because the method steps that are critical to the invention are "not tied to any **particular apparatus** or **machine**" and therefore do not meet the machine-or-transformation test as set forth in *In re Bilski* 545 F.3d 943, 88 USPQ2d 1385 (Federal Circuit, 2008).

Claim Rejections - 35 USC § 112-2nd paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-15 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 5, 11, and those claims dependent therefrom recite, "by measuring a desired area of said cells in information of a plurality of images formed from a plurality of pixels". It is unclear as to what is intended by the limitation "in information". Are territories measures by measuring a desired area of said cells by using information or by measuring desired area of said cells with information? Clarification through clearer claim language is requested.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parada et al. (Trends in Cell Biology (2002) Vol. 12, No. 9, pages 425-432; PTO form 1449 reference) in view of 7,136,540 (Kiyuna).

The instant claims are drawn to a method of measuring a chromosome territory, the method detecting a difference in state between a plurality of cells containing a chromosome territory by measuring a desired area in images having an attribute value. The method comprises extracting a chromosome territory from an image, standardizing and quantifying, detecting a difference in state between cells and classifying said images into classes wherein classifying includes setting values for an attribute parameter indicating an attribute value of each of said classes and for a mixture ratio. Membership probabilities and evaluation functions are calculated to represent a goodness estimation based on said membership probability and a mixture probability distribution and classifying based on fitting or not fitting a predetermined condition.

In regard to claims 1, 5, and 11, Parada et al. teach that chromosomes occupy distinct territories in the interphase cell nucleus (abstract). Recent advances in microscopy allow the routine visualization of said chromosomes in the interphase nucleus and visualization of chromosome territories (see Section 1. Chromosome Territories; Figure 3). Parada et al. also teach that by observing chromosomal territories and positioning, functional roles may be elucidated (see section 5.). These observations in positioning also are extremely useful in areas of cancer detection and tissue specific arrangement of chromosomes, as is taught in Section 6.

Parada et al. do not teach the specifics of the statistical imaging techniques used in the microscopic analysis, however, Kiyuna does teach a method and system of picture region extraction in which a picture region is extracted based on class membership probability (abstract). Specifically, Kiyuna teaches the parameters of claims 1-15 and 17, as follows:

"first step in which the data space constituted by all the attribute values that may be taken by the each pixel on the picture is divided into subspaces with a given resolution, a 65 collection of pixels, each of which takes an attribute value in the each subspace, the average of the attribute

values of the pixels, and the number of the pixels are retained to constitute a coarse-grained space,
a second step in which the number of pixels in the each subspace is divided by the total number of pixels contained in the picture to calculate the coarse-grained empirical probability distribution in the coarse-grained data space,
a third step in which the class parameter, the number of the classes, and the mixture ratio of the classes, which define the attributes of the each class, are initialized,
a fourth step in which a conditional probability distribution under the class being specified is calculated from the class parameter that defines the attributes of the each class, and the conditional probability distribution under the class being specified is averaged within the each subspace to calculate a coarse-grained conditional probability distribution,
a fifth step in which a class membership probability, which is the probability that each pixel constituting the picture belongs to the each class, is calculated by multiplying the class mixture ratio by the coarse-grained conditional probability distribution,
a sixth step in which the class parameter and the class mixture ratio are updated so as to increase an evaluation function,
a seventh step in which a coarse-grained log-likelihood is calculated as the evaluation function using the coarse-grained conditional probability distribution,
an eighth step in which whether the evaluation function satisfies a given termination condition or not is examined, and
a ninth step in which after the evaluation function satisfies the given termination condition, the class parameter and the class mixture ratio are retained, and the region each pixel belongs to is determined based on the class membership probability to extract the desired region,
the fourth, fifth, sixth, seventh and eighth steps being repeated until the evaluation function satisfies the given condition.
In the preferred construction, in the fourth step, when calculating the coarse-grained conditional probability distribution, the average value of the data included in the each subspace is calculated, and the average value is used to calculate the coarse-grained conditional probability distribution in the each subspace.
In another preferred construction, the picture region extraction method further comprises a tenth step in which whether the coarse-grained resolution is equal to the original resolution or not is examined when the evaluation function satisfies the given terminal condition in the eighth step, and an eleventh step in which the resolution of the subspace is reverted to the original resolution if the resolution of the coarse-graining is not the original resolution,
the fourth, fifth, sixth, seventh, and eighth steps being repeated until the given condition is satisfied, using the class parameter and the class mixture ratio that are retained in the ninth step as the initial value in the third step.
In another preferred construction, in the fourth step, when calculating the coarse-grained conditional probability distribution, the average value of the data included in the each subspace is calculated, and the average value is used to calculate the coarse-grained conditional probability distribution in the each subspace,
which comprises a tenth step in which whether the coarse-grained resolution is equal to the original resolution or not is examined when the evaluation function satisfies the given terminal condition in the eighth step, and an eleventh step in which the resolution of the subspace is

reverted to the original resolution if the resolution of the coarse-graining is not the original resolution,
the fourth, fifth, sixth, seventh, and eighth steps being repeated until the given condition is satisfied, using the class 5 parameter and the class mixture ratio that are retained in the ninth step as the initial value in the third step.
In another preferred construction, in the ninth step, the estimated class mixture ratio is multiplied by the total number of pixels constituting the picture to calculate the 10 number of pixels belonging to the each class, and the pixels in decreasing order of the class membership probability are selected to determine the pixels belonging to the each class.
In another preferred construction, in the seventh step, AIC is used as the evaluation function, and the parameter is 15 changed so that the evaluation function may be decreased in the sixth step.
In another preferred construction, in the seventh step, MDL is used as the evaluation function, and the parameter is changed so that the evaluation function may be decreased 20 in the sixth step.
In another preferred construction, in the seventh step, Structural Risk is used as the evaluation function, and the parameter is changed so that the evaluation function may be decreased in the sixth step. 25
In another preferred construction, the third step comprises a first step in which a neighborhood radius which defines whether the each subspace is close to one another, and the number of the classes are set, a second step in which the representative value of each subspace is set for each sub- 30 space, a third step in which the collection of the classification target subspace is set, a fourth step in which the subspace with the highest coarse-grained empirical probability is selected among the classification target subspaces, a fifth step in which all the subspaces having a representative 35 value whose distance to the representative value of the subspace with the highest coarse-grained empirical probability falls within the neighborhood radius are selected as a neighborhood collection, a sixth step in which whether the shortest distance between the representative value of the 40, subspace included in a class for which classification has already been completed, and the representative value of the subspace included in the neighborhood collection is larger than the neighborhood radius is examined, a seventh step in which the neighborhood collection is defined as a new class 45 if the shortest distance between the representative value of the subspace included in a class for which classification has already been completed and the representative value of the subspace included in the neighborhood collection is larger than the neighborhood radius, the neighborhood collection is 50 deleted from the classification target subspace, and the fourth steps and later are repeated, an eighth step in which if the shortest distance is equal to or shorter than the neighborhood radius, the neighborhood collection is added to the classified classes, and the neighborhood collection is 55 deleted from the classification target subspace, a ninth step in which whether the classification target subspace is an empty collection or not is examined, a tenth step in which if the classification target subspace is not an empty collection, the fourth step and later are repeated, and if the classification 60 target subspace is an empty collection, whether the number of classes for which classification has already been completed is equal to a given number or more is examined, an eleventh step in which if the number of classes for which classification has already been completed is fewer than the 65 given number, the neighborhood radius is diminished, and the third step and later are repeated, a twelfth step in which

if the classification target subspace is an empty collection and the number of classified classes is greater than a given number, the class parameter is calculated within each class and taken as the initial value of the class parameter, also, the ratio of the number of subspaces included in each class is taken as the initial value of the class mixture ratio." (beginning column 1).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to have used the imaging techniques of Kiyuna with the microscopic evaluation of chromosome territories, as taught by Parada et al. One would have had a reasonable expectation of success in doing so, as imaging statistical techniques are well know in the art for evaluation of cell and cellular structures and Parada et al. is a generalized method for extracting a target object region from image data.

No claims are allowed.

Inquiries

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the PTO Fax Center. The faxing of such papers must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993) (See 37 CFR § 1.6(d)). The Central Fax Center Number is (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lori A. Clow, Ph.D., whose telephone number is (571) 272-0715. The examiner can normally be reached on Monday-Friday from 10 am to 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached on (571) 272-0720.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system

provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

June 23, 2009
/Lori A. Clow, Ph.D./
Primary Patent Examiner
Art Unit 1631